Getting Started Kit:
Prevent Adverse Drug Events (Medication Reconciliation)

How-to Guide

100,000 Lives Campaign

We invite you to join a Campaign to make health care safer and more effective — to ensure that hospitals achieve the best possible outcomes for all patients. IHI and other organizations that share our mission are convinced that a remarkably few proven interventions, implemented on a wide enough scale, can avoid 100,000 deaths between January 2005 and July 2006, and every year thereafter. Complete details, including materials, contact information for experts, and web discussions, are available on the web at http://www.ihi.org/IHI/Programs/Campaign/.

Goal:

Prevent adverse drug events (ADEs) by implementing medication reconciliation.

The Case for Medication Reconciliation

- Medication errors are one of the leading causes of injury to hospital patients, and chart reviews reveal that over half of all hospital medication errors occur at the interfaces of care.

  Rozich JD, Resar RK. Medication Safety: One organization's approach to the challenge. *JCOM*. 2001;8(10):27-34.

- Experience from hundreds of organizations has shown that poor communication of medical information at transition points is responsible for as many as 50% of all medication errors in the hospital and up to 20% of adverse drug events (ADEs).

- A multidisciplinary check of medication orders for pediatric cancer patients revealed that 42% of the orders being reviewed needed to be changed.

  Branowicki P. Sentinel events: Opportunities for change. Presentation at Massachusetts Coalition for the Prevention of Medical Errors Conference, November 18, 2002.

- Another study, also of pediatric cancer patients, revealed variances between medication orders and information from patient/guardian or prescription labels on the container 30% of the time.

  Billman G. Medication Coordination for Children with Cancer (Children's Hospital – San Diego). Presentation at AAP Patient Safety Summit. May 21, 2002.

An up-to-date and accurate medication list is essential to ensure safe prescribing in any setting.

What Is Medication Reconciliation?

Medication Reconciliation is defined as a formal process of obtaining a complete and accurate list of each patient's current home medications—including name, dosage, frequency, and route—and comparing the physician's admission, transfer, and/or discharge orders to that list. Discrepancies are brought to the attention of the prescriber and, if appropriate, changes are made to the orders. Any resulting changes in orders are documented.

The process involves three steps:

- Verification (collection of medication history);
- Clarification (ensuring that the medications and doses are appropriate); and
- Reconciliation (documentation of changes in the orders).

Preventing ADEs is the impetus behind the concept of medication reconciliation. It was developed by Jane Justesen, a nurse at Luther Midelfort-Mayo Health System in Eau Claire, Wisconsin, as part of an IHI initiative. Among other things, Justesen's team at Luther Midelfort pioneered the tools and forms needed to create, update, and reconcile a patient's medication record during hospitalization—starting at admission and continuing right through to returning home.

Potential Impact of Medication Reconciliation

The reconciling process has been demonstrated to be a powerful strategy to reduce medication errors as patients move from one level of care to another.

- A series of interventions, including medication reconciliation, introduced over a seven-month period, successfully decreased the rate of medication errors by 70% and reduced adverse drug events by over 15%.

  Whittington J, Cohen H. OSF Healthcare's journey in patient safety. *Quality Management in Health Care*. 2004;13(1):53-59.

- In another study, the utilization of pharmacy technicians to initiate the reconciling process by obtaining medication histories for the scheduled surgical population reduced potential adverse drug events by 80% within three months of implementation.

  Michels RD, Meisel S. Program using pharmacy technicians to obtain medication histories. *Am J Health-Sys Pharm*. October 1, 2003;60:1982-1986.

- Several other case studies on the effectiveness of the reconciling process are also available.

  Branowicki P. *Sentinel Events: Opportunities for Change*. Presentation at Massachusetts Coalition for the Prevention of Medical Errors Conference, November 18, 2002.

- A successful reconciling process also reduces work and re-work associated with the management of medication orders. After implementation, nursing time at admission was reduced by over 20 minutes per patient. The amount of time that pharmacists were involved in discharge was reduced by over 40 minutes.

  Rozich JD, Resar RK, et. al. Standardization as a mechanism to improve safety in health care: mpact of sliding scale insulin protocol and reconciliation of medications initiatives. *Joint Commission Journal on Quality and Safety*. 2004;30(1):5-14.

Why Is There a Problem?

The challenges faced by organizations include the following:

- There is no clear owner of the process. In some cases, the collection of medication history is completed by a nurse, in others by a pharmacist, and in others by a physician. However, no one has been specifically assigned to completing this process.
- There is no standardized process to complete the collection of this information and ensuring that it is available to the clinician who will be writing orders. Nurses from different units, or within the same unit, may be using different processes. Physicians do not have a defined process to communicate changes in doses or treatment plans using existing processes.
- There are many situations in which the patient is not in a position to provide a list of medications. Other times we hear statements such as "I take a blue pill" or "I do not remember the name." Accurate sources of information may be difficult to identify unless one has taken the time to explore and test different methods to collect this information.
- A major challenge is ensuring that the medication history is linked to the admission orders. Placing the medication list in a prominent location in the chart so that prescribers can easily access the information is a key to success.
- Ultimately, the medication list must be linked as patients transition from one level of care to another. The goal is to develop a process that provides an accurate list that can be used as patients are admitted, transferred through the institution, and eventually discharged.

Using the Model for Improvement

In order to move this work forward, IHI recommends using the Model for Improvement. Developed by Associates in Process Improvement, the Model for Improvement is a simple yet powerful tool for accelerating improvement that has been used successfully by hundreds of health care organizations to improve many different health care processes and outcomes.

The model has two parts:

- Three fundamental questions that guide improvement teams to 1) set clear aims, 2) establish measures that will tell if changes are leading to improvement, and 3) identify changes that are likely to lead to improvement.

- The Plan-Do-Study-Act (PDSA) cycle to conduct small-scale tests of change in real work settings — by planning a test, trying it, observing the results, and acting on what is learned. This is the scientific method, used for action-oriented learning.

Implementation: After testing a change on a small scale, learning from each test, and refining the change through several PDSA cycles, the team can implement the change on a broader scale — for example, test medication reconciliation on admissions first.

Spread: After successful implementation of a change or package of changes for a pilot population or an entire unit, the team can spread the changes to other parts of the organization or to other organizations.

You can learn more about the Model for Improvement on www.IHI.org

How To Do It:

Forming the Team

A team approach is needed to ensure that this process is completed successfully. We recommend that the organization identifies a multidisciplinary team consisting of, at a minimum, a nurse, a pharmacist, and a physician.

Setting Aims

Improvement requires setting aims. The aim should be time-specific and measurable and define the specific population of patients that will be affected. Examples of aims at the organizational level:

- Reduce the percentage of unreconciled medications at admission, discharge, and transfer to zero within the next 18 months.
- Improve medication reconciliation by 75% on each unit at admission and discharge within 12 months.

As teams work on different steps in the reconciliation process, the aims should be specific to that portion of the project. For example:

- Reduce the percentage of unreconciled medications at admission on the pilot unit by 50% within the next three months.

Involving Patients

Medication reconciliation is a team effort, including the patient. Patients can play a vital role in medication reconciliation by carrying a list of the medications they are taking. Having this information available can help make the reconciliation process more efficient and effective. Many organizations, such as McLeod Health in South Carolina, are working on medication forms or cards that can easily be used by clinicians and patients.

St Luke's Hospital in Cedar Rapids, Iowa, partnered with local physicians, Mercy Hospital, and the Iowa Pharmacy Association to create a city-wide program of medication cards that is supported by the hospitals, physician clinics, and local

pharmacies. Patients are reminded by all stakeholders to bring their medication cards to each visit.

Getting Started

- Select the team and the pilot unit to begin testing.
- We suggest that you start at the admission process. As patients may be admitted to the hospital from a number of points, select one area (e.g., pre-operative screening or the emergency department).
- Using a simple flow diagram, determine the process in place at this time. (For example, see Luther Midelfort's *Medication Reconciliation Flowsheet* on IHI.org.)
- Collect baseline data as described in the measurement section. This information will help you determine how effective your current process is, as well as help make the case for implementing medication reconciliation.
- Test the use of a data collection form in your institution. (For example, see Luther Midelfort's *Medication Reconciliation Review: Data Collection Form* on IHI.org.) The purpose of the form is to aid in the collection of a medication history, to share that information with prescribers, and to facilitate reconciliation (the documentation of why a medication has been discontinued or placed on hold). A number of forms have been developed by different organizations. The forms may require modifications before use in your institution. Our recommendation is to test the form first on a small scale before implementation and modify as needed.

First Test of Change: Using the Data Collection Form

(See Appendix A for data collection form.)

- Ask the nurse member of your team, or another willing nurse, to test the data collection form to determine ease of use, ability to capture needed information, and other formatting issues. Use the results of this test to modify the form.
- The list of medications may never be perfect. According to Roger Resar, MD, Senior Fellow at IHI, and a pioneer in developing this process, the phrase "as complete as possible" is key.
- Once the form has been modified, ask one nurse to use it to collect one patient's medication history.
- Continue testing the form until you have reached a point where it is easy to use, collects the information as needed, and allows for communication as patients move through different levels of care.

How to Conduct a Medication Reconciliation Review

1. Obtain a set of 20 closed patient records, using as random a selection process as possible.
2. Have each team member review the patient records, counting errors due to unreconciled medications.
3. Tally errors from unreconciled medications.

Note:

- This is a count of medications, not doses.
- The rate of errors may vary depending on the processes in place. Unless you have developed a robust reconciliation process, if you find very few errors, suspect the quality of the review.

Identifying Unreconciled Medications at Admission

Look for discrepancies in medication orders between outpatient and inpatient settings, pre- and post-intra-hospital transfers, and discharge documents, using the following steps:

1. Compare all medications ordered upon admission with any available information about medications the patient was taking prior to admission. Each medication that is *not* ordered or commented on represents a discrepancy and should be counted as an error. Apply clinical judgment for the obvious. (Example: Patient is admitted for bleeding associated with anticoagulation. Warfarin is not ordered on admission. Since the medication was intentionally discontinued and the reason is obvious, this is not an error.)
2. If staff is unable to determine whether a medicine has been intentionally omitted, it is unreconciled.

3. Look for any adverse drug events that might be indicated in the charts or discharge summaries. Then review the details to see if the ADE was the result of the inadvertent discontinuation of a medication or an order that was missed at a point of transition (at admission, transfer to another patient care unit, post-procedure, or discharge). If you find this, it counts as an error, as well as being an ADE.

Track Your Measures over Time

Improvement takes place over time. Determining if improvement has really happened and if it is lasting requires observing patterns over time. Run charts are graphs of data over time and are one of the single most important tools in performance improvement.

Using run charts has a variety of benefits:

- They help improvement teams formulate aims by depicting how well (or poorly) a process is performing.
- They help in determining when changes are truly improvements by displaying a pattern of data that you can observe as you make changes.
- They give direction as you work on improvement and information about the value of particular changes.

Use these two key measures to evaluate the effectiveness of Medication Reconciliation:

- Percent of Unreconciled Medications
- Unreconciled Medications per 100 Admissions

See Appendix B for the measurement information forms (MIFs), which contain detailed information about these measures.

Tips for Collecting Data

Teams from IHI Collaboratives and the Massachusetts Coalition for the Prevention of Medical Errors suggest the following tips:

- Divide the process into several steps and share responsibilities.
- Involve administrative support to identify/pull charts.
- Develop a quick audit tool, and have nurses, MDs, and pharmacists from the implementing unit pull the necessary data from the subset of charts each reviews.
- Assign responsibility for aggregating the data and developing charts that can be displayed on the units to one person and presented in reports to leadership (e.g., quality improvement representative or team leader).
- Engage clinicians in making decisions on measure definitions, clinical underpinnings of what really constitutes "unreconciled," and actual chart review at least for the baseline and early data collection.
- Engage the best available resources, based on your own organization's resource constraints.
- Consider using an experienced pharmacy technician to collect the medication history.
- Consider using pharmacy residents to collect the medication history.
- Incorporate the reconciliation review into an existing data collection program.
- Focus only on the parts of the chart that deal with your work. You should only need to review the reconciling form and the admit orders.
- Limit your sample to 20 charts per month on the unit where you are testing the process.

- Set a timer as a reminder to limit your review of each chart to 15-20 minutes.

Things to remember when interviewing patients: (OSF St. Francis)

- Utilize open-ended questions (what, how, why, when) and balance with yes/no questions.
- Use nonbiased questions that do not lead the patient into answering something that may not be true.
- Pursue unclear questions until they are clarified.
- Ask simple questions, avoid using medical jargon, and always invite the patient to ask questions.
- Let the patient know the importance of using one central pharmacy/pharmacist.
- Educate the patient on the importance of using a medication wallet card and bringing their medications to the hospital, physician's office, etc.
- When asking about all medications, be sure to get the name, dosage form, dosage, dosing schedule, and last dose taken – be as specific as possible about prn (as needed) medications.
- Prompt the patient to try and remember patches, creams, eye drops, inhalers, sample medications, shots, optic, herbals, vitamins, and minerals.
- When discussing allergies, educate the patient on the difference between a side effect and a true allergy—e.g., rash, breathing problems, hives.
- Have patients describe how and when they take their medications (more vague responses may indicate noncompliance).

Steps to take if the patient cannot remember a medication or if clarification is needed:

- Obtain a detailed description of the medication from the patient or a family member—dosage form, strength, size, shape, color, markings.
- Talk to any family members present or contact someone that could possibly bring in the medication or read it over the phone.
- Try calling the patient's pharmacy to obtain a list of medications that the patient has been regularly filling.
- Contact the patient's physician/physicians to try and get an accurate listing of their current medications.
- Obtain previous medical records.

Barriers That May Be Encountered

> Staff may think of reconciling medications as additional work.

Developing the forms and the system to ensure that the process is completed reliably each time will require some time. In the long run, reconciling medications saves time for physicians, nurses, and pharmacists (Rozich JD, Resar RK. Medication safety: One organization's approach to the challenge. *JCOM*. 2001;8(10):27-34). Completing this process also reduces the opportunity for errors and the associated adverse events that can lead to harm.

> "Isn't this the physician's job?"

Reconciling medications is a team process. All disciplines must be involved and complete portions of the process. The patient can also play a key role in facilitating the verification and clarification steps.

> Fear of change

All change is difficult. Many nurses interviewed responded that collecting the appropriate medication history and ensuring that the admit orders reflect appropriate therapy is essential to decreasing errors and rework. The framework suggested by IHI is one that helps to build reliability into the process.

> Communication breakdown

Organizations have not been successful when they failed to communicate with staff about the importance of reconciling medications, as well as the ongoing teaching of new staff.

> Physician and staff "partial buy-in" (i.e., "Just another flavor of the week?")

In order to enlist support and engage staff, it is important to share baseline data as to how reliable the existing process is in reconciling medications. As you develop the process in your system, you will find ways to simplify and standardize, resulting not only in a decrease in errors but also in increased efficiency and satisfaction.

APPENDIX A: DATA COLLECTION FORM

Medication Reconciliation Data Collection Form:

Errors from Unreconciled Medications

Patient Record	Review Date	Errors at Admission	Errors during Transfer	Errors at Discharge	Total Errors	Number of Records Reviewed
1						
2						
3						
4						
5						
Etc.						
					Total Errors from Records Reviewed	Total Records Reviewed

*This form is useful if tracking by admissions or records reviewed.

Luther Midelfort — Mayo Health System

Eau Claire, Wisconsin, USA

APPENDIX B: MEASURE INFORMATION FORMS

Measure Information Form:
Percent of Unreconciled Medications

Intervention(s): Medication Reconciliation

Definition: Percent of unreconciled medications

Goal: Reduce the percent of unreconciled medications in your area of focus (admission, transfer, or discharge) by 75 percent or more. It is anticipated that each organization will ultimately address all three areas related to reconciliation (admission, transfer, and discharge). It is best to start with admission reconciliation.

Matches Existing Measures:

- No existing JCAHO measure; JCAHO suggests that organization track progress through measurement of the organization's own design.
- There is an IHI.org website Improvement Tracker established for this measure: http://www.ihi.org/IHI/Topics/PatientSafety/MedicationSystems/Measures/PercentofUnreconciledMedications.htm

CALCULATION DETAILS:

Numerator Definition: Number of unreconciled medications on reviewed charts (Note: This is a count of medications, not doses.)

Numerator Exclusions: Unreconciled over-the-counter (OTC) and herbal medications are not to be counted in the numerator when first starting this process. The recommended approach is to reconcile prescription medications first; once a good process is in place, then add OTC, herbals, and other medications.

As stated above, organizations should start by focusing on reconciliation at admission; in this case, exclude all medications not associated with admission.

Denominator Definition: The denominator is the total number of medications ordered for patients in the sample (e.g., from home medication list or MAR prior to transfer or discharge) and all medications ordered at transition (admitting or transfer orders or discharge instructions) in the reviewed sample of charts.

Denominator Exclusions: Do not count over-the-counter (OTC) and herbal medications in the denominator when first starting this process. The recommended approach is to reconcile prescription medications first; once a good process is in place, then add OTC, herbals, and other medications.

As stated above, organizations should start by focusing on reconciliation at admission; in this case, exclude all medications not associated with admission.

Measurement Period Length: Monthly

Definition of Terms:

- Unreconciled Medication: A medication is considered unreconciled if omitted in an order without explanation.

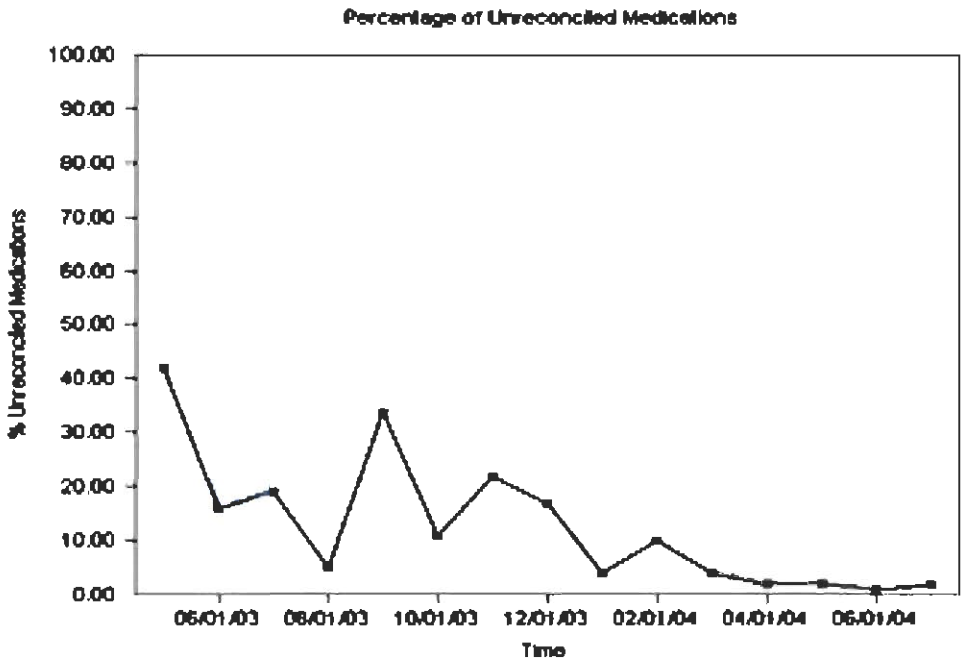
Calculate as: (numerator / denominator) x 100; as a percent of unreconciled medications

Comments: When comparing medications on different orders for the same patient, if a medication is omitted in one of the orders without explanation, be sure to check the progress notes for a documented reason. If a legitimate reason for not ordering the medication is found—for example, the patient is toxic from too much of the drug—then the medication would be considered reconciled.

COLLECTION STRATEGY:

Every month, collect a random sample of 20 closed patient records from patients with a minimum two-day length of stay.

SAMPLE GRAPH:



Measure Information Form:
Unreconciled Medications per 100 Admissions

Intervention(s): Medication Reconciliation

Definition: The number of unreconciled medications per 100 patient admissions

Goal: Reduce by 75 percent or more

Matches Existing Measures:

- No existing JCAHO measure; JCAHO suggests that organizations track progress through measurement of the organization's own design.
- There is an IHI.org website Improvement Tracker established for this measure: http://www.ihi.org/IHI/Topics/PatientSafety/MedicationSystems/Measures/Errors+Related+to+Unreconciled+Medications+per+100+Admissions.htm. (Note: Although the title of this Improvement Tracker measure differs slightly from this one, the measures are the same.)

CALCULATION DETAILS:

Numerator Definition: Number of unreconciled medications on reviewed charts throughout patient stay from admission to discharge (Note: This is a count of medications, not doses.)

Numerator Exclusions: Unreconciled over-the-counter (OTC) and herbal medications are not to be counted in the numerator when first starting this process. The recommended approach is to reconcile prescription medications first and once a good process is in place, then add OTC, herbals and other medications.

Denominator Definition: The denominator is the total number of patients in the sample

Denominator Exclusions: None

Measurement Period Length: Monthly

Definition of Terms:

- Unreconciled Medication: A medication is considered unreconciled if omitted in an order without explanation.

Calculate as: (numerator / denominator) x 100; as the number of unreconciled medications per 100 admissions

Comments: When comparing medications on different orders for the same patient, if a medication is omitted in one of the orders without explanation, be sure to check the progress notes for a documented reason. If a legitimate reason for not ordering the medication is found, such as the patient is toxic from too much of the drug, then it would be considered reconciled.

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